# ON THE EARLY STAGES OF CERTAIN GEOMETRID SPECIES.

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As the result of our breeding of Lepidoptera during the past two years we have accumulated a number of notes on the early stages. Finding that in several cases there is apparently nothing known of the life history, we venture to present these notes on Geometrid larvæ in the hopes that other workers may be stimulated to study in more detail these species. There is an extensive field open in the study of the early stages of our North American Geometridæ, Doctor Dyar being practically the only one who has published during the last ten years any articles in this particular line.

When one takes into account the ease with which most Geometrids will deposit eggs and the hardy nature of the larvæ we are surprised that not more is known of the early stages; as an instance we might cite that the whole of the *Eupethecia* group is practically unworked territory, or if work *has* been done nothing has been published, which is just as bad. The one difficulty in breeding from the egg is that there is often no record of the food-plant and the young larvæ perish miserably before the proper leaves can be found; we have found this the case with *Eucymatoge intestinata*, *Sciagraphia mellistrigata* and others; *Pero honestarius* has accepted wild cherry, but has never thriven, dying after the first moult. If collectors could but be induced to publish their observations concerning larval food-plants, even if they could not work out the life history themselves they would at least pave the way for some other worker and facilitate greatly the study of the early stages.

### Dyspteris abortivaria H. S.

*Ovum.* Pale green, turning darker before hatching; duration of egg stage 8 days.

*Stage I.*

Head orange-brown; body pale yellow green, cylindrical; prothorax with two sharp conical protuberances on anterior margin, somewhat resembling a dog's ears. Length 3 mm.

*Stage II.*

Head slightly yellowish; body smooth, shiny, cylindrical, green, with prothoracic "ears" sharply pointed. Length 6 mm.

*Stage III.*

Very similar to preceding stage; traces of reddish on dorsum and rear segments; faint red dorsal and subdorsal spots at the junction of segments. "Ears" very prominent, tinged with red. Length 12.5 mm.

*Stage IV.*

Head small, well hidden by prothorax which is squarely built with "ears" drawn out into two sharp points; body cylindrical, green, tinged with rose, which color increases gradually towards the anal segments, until it becomes the prevailing color; anterior margin of prothorax rose; three rose-colored dots on posterior portion of each segment dorsally. Length full grown 30 mm.

The larva spun up but failed to pupate.

*Food plants.* Ampelopsis; Vitis.

**Eupithecia miserulata** Grt. (*teste* Grossbeck).

*Ovum.* Oval, flattened slightly at micropylar end, 4 mm. long; when first laid pale yellow, later light orange. The whole surface of egg is faintly sculptured with irregular hexagons. Duration of egg stage about 6 days.

*Stage I.* May 18th.

Head black; body muddy green, slightly lighter laterally. Length, after feeding a day, 3 mm.

*Stage II.* May 23d.

Slender, cylindrical, tapering anteriorly; dull yellowish-green, skin granulated; a broad red dorsal stripe tending to diamond-shaped enlargements in centre of each segment; traces of a red subdorsal line on first two segments and a narrow lateral line of similar color. Legs black. Length 5 mm.

*Stage III.* May 26th.

Pale whitish, markings as before but rather clearer. Length 9 mm.

*Stage IV.* May 30th.

Head small, flat, whitish, with sparse hairs; body tapering anteriorly, rather flat with prominent lateral fold; skin somewhat granulate, whitish; a narrow reddish dorsal line, and a broad dorsal arrow-shaped mark with apex pointed forward and resting on dorsal line on first five abdominal segments; 6th abdominal with very small arrow-mark; other segments without; a brownish-red subdorsal line, distinct on thoracic segments, very faint on abdominal, where it forms a lateral boundary to the dorsal arrow-marks; a red stripe below lateral fold of skin; ventrally whitish; claspers white. Length full grown 18 mm. Pupation on surface of earth in slight web on June 4th.

*Pupa.* Whitish with legs, antennæ, and veins on wing cases marked distinctly in black. Emerged June 16th.

*Food plants.* Our larvæ were fed up on the flowers of dandelion. We discovered similar larvæ later on willow and wild cherry, which, however, did not reach the imaginal stage.

### Percnoptilota fluviata Hbn.

The larval stages of this species have already been recorded by Doctor Dyar (Psyche 1899, p. 429). Larvæ reared from ova by us offer considerable differences to those described by Doctor Dyar; we therefore publish our notes for the sake of recording the larval variation.

*Ovum.* Pale yellow when first laid, turning later darker; oval, with flattened micropylar end; faintly sculptured with regular hexagons. Length .5 mm. Duration of egg stage 7 days.

*Stage I.*

Entirely dull greenish black, head slightly reddish. Length 2 mm.

*Stage II.*

Head slightly reddish; body greenish white with faint traces of geminate dorsal and subdorsal lines; abdominal segments with rather diffuse lateral purplish patches. Length 6 mm.

*Stage III.*

Head light greenish, mottled with reddish. Body green with geminate light yellow dorsal stripe tending to diamond-shaped enlargements on segmental incisions; two dorsal yellowish lines; lateral portions tinged with reddish-purple which on abdominal segments forms indistinct transverse bands across the body at junction of segments, lateral portion usually contains a dark streak. Beneath yellowish-green. Length 9–10 mm.

*Stage IV.*

Color and markings very variable—green to reddish brown, head whitish, striped and sprinkled with reddish; indistinct geminate dorsal and subdorsal stripes; the abdominal segments are crossed by 5 purplish intersegmental bands, most distinct in the green larvæ; laterally these bands are often terminated by a blackish longitudinal dash. Tubercles small, white; claspers usually marked with purplish. Beneath segmental divisions frequently marked with yellow. Length 19 mm.

Food plant, Rumex.

### Tornos scolopacinarius Gn.

*Stage I.*

Head deep brown, sprinkled with white, slightly broader than first segment. Body brownish-black, cylindrical, granulate in appearance, anterior margin of prothorax white; traces of white subdorsal, lateral, and spiracular lines. On abdominal segments II, III and IV the tubercles are large, semiconical, and white, forming to the casual glance an almost continuous white transverse band across segment; on segment III the dorsal tubercles coalesce, forming a single conical black wart arising from a white base; other tubercles small, whitish, with black setæ. The ventral surface is studded with white tubercles. Length 1.6 mm.

*Stage II.*

Head and body deep brown, former small, slightly retractile, sprinkled with white and with two creamy stripes on posterior portion. Body wrinkled in appearance,

thickly sprinkled with whitish or light brown granules, with black dorsal line and traces of creamy subdorsal stripes. Dorsally on abdominal segments II, III and IV, a pair of conical protuberances, tipped with creamy, those of III uniting to form a large single wart; on these segments the lateral tubercles are also prominent and heavily marked with cream-color, sustaining the appearance of the white transverse bands of the previous stage. Beneath darker than above. Length 4 mm.

At rest the larva assumes a curved position similar to a question mark, with the head just removed from the twig or leaf, and when disturbed will keep up a swaying motion from side to side for a considerable length of time.

*Stage III.*

Very similar to previous stage; dorsal tubercles all conical, small, except those of 2d, 3d, 4th and 8th abdominal segments, that of III being largest, single, formed by junction of two dorsal tubercles. Slightly waved subdorsal and lateral lines, and a much waved spiracular line which forms oblique stripes on abdominal segments 2–6, extending upwards as far as the lateral line; a dorsal dark line formed by the lack of white granulations on this portion of the body; lateral warts of II, III and IV abdominal all more or less tinged with creamy. Beneath with medio- and subventral lines. Length 6.3 mm.

*Full grown (Stage V?).*

Head and body reddish-brown to deep brown, granulate in appearance; body cylindrical, thoracic segments rather swollen; tubercles I of abdominal segment III unite to form a conical wart, inclined rather towards rear, and bifid at its apex; tubercles of segments II, IV and VIII small, conical, separate, but larger in comparison than the same tubercles of the remaining segments; all other tubercles minute. An indistinct dark dorsal stripe, and an irregular subdorsal one, bordered laterally with yellowish and tending to form V shaped marks on central abdominal segments, the apex of the V pointing backwards; in dark colored specimens these markings are almost obsolete. A light yellow spiracular stripe, straight on the thoracic segments, indistinct on first abdominal, broken and forming 5 oblique upwardly inclined stripes on the following segments, lacking on rear segments; these oblique pale stripes are bordered dorsally with blackish shades, the last of which continues as a lateral dark stripe to the anal segment. Beneath as above with a broad dark subventral stripe. Spiracles pale, rimmed with black. Length 20 mm.

Food plant, Aster.

### Ectropis crepuscularia D. & S.

The early stages of this species are doubtless well known in Europe. We know of no account of the life history of the American form. It may prove interesting for the sake of comparison.

*Ovum.* Pale green, smooth, oval, laid in batches under slight covering of wool. Hatches in 7 days.

*Stage I.*

Black with a double row of white dorsal spots, consisting of two on anterior and two on posterior portion of each segment, and a broad irregular white lateral stripe. In later stages the larva turns dull purplish-brown. Length 2 mm.

*Stage II.*

Head light brown, marbled over with darker streaks and dots; body dorsally, olive-brown to black, ventrally, black; four whitish dorsal lines, the central two of which show traces of the dots of previous stage in slight enlargements at anterior and posterior portions of segment; a thin white lateral line followed ventrally by white segmental blotches; on second abdominal segment a black lateral patch. All marking more or less obsolete towards posterior end.

*Stage III.*

Head brown, rather square, with darker markings; body light brown, shaded with black, especially on central abdominal segments, traversed by a series of longitudinal stripes of a lightish yellow color; a prominent black oblique patch on 2d abdominal segment; slight elevation on 8th abdominal segment, edged with oblique black stripe; no trace of white dorsal dots or lateral stripe; first pair of prolegs with broad white stripe.

*Stage IV.*

Very variable in color; head yellowish, sprinkled and marbled with red-brown and with black stripes at apical portion of clypeus; body usually red-brown, often dull ochreous, marbled and lined with dark and light shades; the most constant features are a black velvety lateral patch on second abdominal segment and yellowish stripe on first pair of prolegs; traces of whitish dorsal stripe and geminate black lateral band are present, and often a wavy yellowish lateral line is apparent; fleshy protuberance on 8th abdominal segment with lateral black shading; tubercles small, black. Beneath darker than above. Length 16 mm.

*Stage V.*

Head as before; mesothoracic segment swollen; black patches of 2d abdominal segment lacking; ground color deep red-brown, shaded with black; geminate black dorsal stripe more or less distinct, tending to spread apart and enclose white spots on posterior portion of segments; double black lateral stripe, most prominent on anterior portion of body; black oblique mark on side of fleshy protuberance of 8th abdominal segment, yellow stripe on first prolegs. Beneath dark smoky brown, with traces of yellow median line. Spiracles yellow with black rim; tubercles black. Length 25 mm.

Food plants. Various trees and shrubs.

### Metanema determinata Wlk.

*Ovum.* Pale green, turning later yellowish white with numerous orange dots and stripes; oval, twice as long as broad, smooth or very slightly pitted. .8 by .4 mm.

*Stage I.*

Head flesh color with broad lateral dark-red stripe, continued over prothorax. Body whitish green with a broad red dorsal stripe and lateral stripes of a similar color continued down sides of first pair of prolegs; tubercles and setæ minute. Legs reddish. Length 4 mm.

*Stage II.*

No change from previous stage; general color whitish. The stripes in advanced stages turn deep brown. Length 7 mm.

*Stage III.*

Head white, flat, narrowed posteriorly with broad dark-brown lateral stripe and dorsal V-shaped mark. Body whitish green with broad brown dorsal and lateral stripes; a subdorsal stripe, the continuation of the stripe on head, is distinct on first two segments, indistinctly wavy on others. On 2d and 3d abdominal segments traces of brown shading between subdorsal and lateral lines; traces of a thin, waved, spiracular line; first pair of prolegs brown; anal claspers with brown stripe on anterior margin. Length 9 mm.

In late stages the dark dorsal stripe tends to disappear, the ground color becomes brown to brownish yellow and numerous light longitudinal striæ appear, leading to the markings of the following stage.

*Stage IV.*

Head flesh-color, marbled with brown, with broad brown lateral stripe. Body light ocher, strongly mottled and marbled with brown. Markings indistinct and diffuse, consisting of numerous longitudinal lines of which a light subdorsal one is most prominent. A broken geminate dorsal black line is present on anterior and posterior segments; the central segments are shaded laterally with black, and a faint white supraspiracular stripe is visible; the lateral black band of the preceding stages lies beneath the spiracular fold and is continued down the anterior margin of the anal claspers, edged with whitish ventrally; tubercles II of abdominal segments black, not prominent. Ventrally whitish with 4 brown longitudinal lines. Legs white, slightly mottled with brown, prolegs considerably more mottled. Length, full grown, 22 mm.

Food plant. Willow.

### Metanema quercivoraria Gn.

*Ovum.* When first laid dirty green, turning soon red-brown, shiny, regularly sculptured with an hexagonal design, the lines composing which are slightly raised; in shape oval, considerably flattened at the micropylar end. Length 8 mm. Duration of egg stage 12 days.

*Stage I.*

Very slender in shape. Head light brown. Body whitish green to light brown, lighter towards posterior end; a lateral row of 7 or 8 small black dots, one situated near the posterior margin of each abdominal segment. Length 5 mm.

*Stage II.*

Head pale reddish, as broad as prothorax. Body very slender, pale green, becoming lighter towards anal extremity and marbled laterally with dark brown on first two and last three segments; a lateral row of 8 black dots, commencing on metathorax and situated near hind margin, on abdominal segments posterior to the spiracles; a brown lateral line, sometimes broken, often continuous. Length 9 mm.

*Stage III.*

Head pale green, marbled strongly with brown and with reddish-brown lateral patch. Body pale green with faint traces of dorsal and subdorsal lines; a broad purplish lateral stripe most marked on anterior and posterior segments where it is broadest and marbled with white; black lateral spots as in previous stage; tubercle

II on abdominal segments III, IV, V and VI prominent, black. Beneath green with a pair of small black warts on the rear of abdominal segments. Length 16 mm.

*Stage IV.*

Head yellowish marbled with brown. Body green or yellow-green, in some cases much marbled with brown; lateral purple stripe prominent only on anterior and posterior segments where it is marbled with white; black lateral dots as before; black dorsal tubercles also present, especially prominent on abdominal segment III, where they form more or less raised warts; claspers striped with purplish, being the continuation of the lateral stripe. Two small black tubercles on posterior margin of segments underneath. Length 25 mm.

*Stage V.*

Very variable in ground color and markings. The majority have pale green head, marbled with brown; body olive green with no traces of stripes; mesothorax swollen, with reddish-purple lateral wart, shaded inferiorly with lighter, this color being continued forward to the head. Third abdominal segment with two prominent dorsal red-brown warts, more or less confluent, and two lateral ones, all situated on posterior portion of segment; similar dorsal warts on 6th abdominal. Rear segments shaded with purple brown; lateral dots of previous stages almost or wholly lacking; tubercle II of abdominal segments also much less marked with black. Beneath green with two reddish warts in medio-ventral region of 2d abdominal segment.

Other larvæ are generally much browner in appearance, due to geminate dorsal, subdorsal and lateral lines filled in with brown, but much broken and irregular. Beneath markings of dorsal surface repeated; all tubercles and warts more prominently marked than in the green form of larva; tubercles frequently arise from a small white patch, being themselves black; tubercle II of 4th and 5th abdominal segments often reddish, more or less prominent. Length full grown 37 mm.

*Pupa.* Light brown, strongly marked with olivaceous and darker shades of brown; antennæ and leg sheaths darker; wing cases with numerous small grooves, giving a general sponge-like appearance. Spiracles dark brown; segmental incisions banded with dark brown; cremaster with two strong hooks.

Food plant. Quercus.

The species is double-brooded, the first specimen emerging 52 days from date of oviposition.

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## A NEW SPECIES OF *PSELLIOPUS* (*MILYAS*).

By Wm. T. Davis,
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While in quest of insects in the country to the west of Beltsville, Prince George Co., Maryland, on September 26, 1911, with Mr. Frederick Knab and Mr. Clarence R. Shoemaker, I observed that